U. S. DEPARTMENT OF AGRICULTURE
OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING
WASHINGTON, D. C.

FIELD LETTER FOR NOVEMBER No. 10

December 1, 1915.

DIVISION OF CONSTRUCTION
Vernon M. Peirce, Chief

Projects:

General

J. T. Voshell, S.H.E., left Washington November 18 to inspect the Ohio and Texas Post Roads. He will also confer with G. B. Noble, State Highway Commissioner of Oklahoma, in regard to road building with convicts in Pottawatomie County, and with the officials of Burleson County, Texas, in regard to a proposed bond issue.

The trip of inspection of a road from San Diego, Calif., to Washington, D. C., by the Southern National Roads Association has been completed, the party arriving in Washington, November 27, having left San Diego November 2. B. H. Burrell, S.H.E., accompanied the representatives of the association on this trip and is now preparing his report.

J. D. Fauntleroy, S.H.E., W. E. Rosengarten, H.E., and Mack Galbreath, J.H.E., have been transferred to the Division of Road Economics.

Object-Lesson Roads

The construction of the bituminous macadam and cement-concrete roads in Allen County, Indiana, has been completed and H. C. Wells, S.R.C., reported to the Office November 29 and is preparing his reports.

F. A. Davis, J.H.E., was assigned November 22, to superintend the construction of a sand-clay object-lesson road in Claiborne Parish, Louisiana.

The bituminous macadam construction on the campus of the University of Florida, at Gainesville, is completed and E. S. Alderman, J.H.E., is preparing a bulletin about it for publication by the Extension Department of the University.

J. C. Wonders, S.H.E., is superintending the construction of an earth object-lesson road at Hanover, Kansas, having been assigned to that work November 9.

Post Roads

The Maine Post Road has been completed and E. O. Hathaway, S.H.E. and H. S. Parry, J.H.E., are preparing the final report.

Work on the Mississippi Post Road is practically completed and the final report is being prepared by H. H. Lotter, S.H.E., who has the project in charge.

R. H. Harrison, J.H.E., is now in charge of the Texas Post Road in Comal County, having relieved Mr. Rosengarten who is now working on economic studies of the post road.

B. F. Heidel, S.H.E., conferred with W. J. R. Weir, H.E., at Aiken, South Carolina, in regard to the progress of the work on the South Carolina Post Road from November 19 to 29, and has returned to his assignment in Georgia.

Advice and Inspection

W. H. Lynch, S.H.E., was assigned November 15 on an advice and inspection assignment in Shelby County, Alabama, leaving the work of planning a system of roads to be improved from a bond issue of about $1,000,000 in Polk County, Florida, in the hands of J. W. Janssen, H. E.

The report for a system of roads in Pickett County, Tennessee, prepared by M. E. Worrell, H.E., was received at the Office November 29.

Field Experiments

The work of completing the experimental gravel road from near Gum Spring on the Virginia Post Road to Mt. Vernon, is progressing nicely. J. H. Eldridge, S.R.C., is in charge, assisted by A. S. Hathaway, J.H.E.

Two short sections of experimental roads totalling about 660 square yards, one on each side of the main building of the Department of Agriculture, are under construction by the Cranford Paving Company, Washington, D. C. About one-half in length of each road is to consist of a 2-inch compacted bituminous concrete surface on a 6-inch cement concrete base, the surface being that known as the "District of Columbia Specifications." The remaining portion of each road is to be similar with the exception that the surface is to be constructed in accordance with "Topeka Specifications."

The work was started November 23 and is to be completed within 20 weather-working days. W. H. Rhodes, Jr.H.E., is the Office representative in charge.

Bridges and Culverts
O. L. Grover in charge

Several preliminary copies of general bridge specifications have been received and some of them reviewed for the benefit of State Highway Commissions and others. A design for a bridge over the bay on the road from Boothbay Harbor to Southport, Maine, is being prepared.

DIVISION OF ROAD MAINTENANCE
E. W. James, Chief.

Projects:

Advice, Inspection and Lectures

E. W. Jamesappeared before the County Board of Hernando, Florida, at Brooksville on November 1 and before the Board of Pinellas County, at Clearwater, November 2, to arrange for cooperation in maintaining the road from Brooksville to St. Petersburg by way of Tarpon Springs. Mr. James also inspected the bituminous sand experimental section built at Brooksville by the county officials; and a section built at Haskell, Polk County, was inspected on November 3. On November 5 he made an address before the City Council of Fort Myers and the Board of Trade, in connection with the maintenance project.

Geo. C. Scales, S.H.E., delivered a lecture on "Road Maintenance" before the Convention of County Commissioners of Georgia in Atlanta, Georgia, on November 17, and a talk at Columbus on the 18th. He has also been assigned to deliver lectures at Gainesville, Florida, on December 7 and 9.

State and County Studies

On November 16 and 17, E. W. James made an inspection in Baltimore County, Maryland, in company with representatives of the county and A. S. Brainerd, S.H.E., for the purpose of cooperating with the Division of Economics in making a full report on the road organization of that county with suggestions for improvement.

Washington-Atlanta Highway

D. H. Winslow, S.R.C., reports that since March 1 of this year, Cumberland County, N. C., has expended $882.30 on bridges and culverts alone on a section of the highway in that county. This is about two-thirds of the allotment made by Cumberland County for the year, and was necessary because of unusually heavy rains and of the large number of old wooden culverts still remaining on the route.

In Harnett County nine (9) miles of relocation and construction are now under way.

Lunenburg County, Virginia, has posted the red, white and blue signs from the Nottaway line to a point four (4) miles south of Kenbridge, making ten (10) of the nineteen (19) miles completed. Tourists are now routed from Petersburg via Blackstone and Kenbridge and report the route as better. This new route has also been entered on the maps of the Highway and the former route has been taken out. Signs have also been put up between Clayton and Smithfield Townships.

The two mile section at Wilson Mills in Johnston County, which last year was not under the supervision of this Office, has now been constructed as a gravel road. The section of the Leesville Road,

left unfinished last season, has been completed to within half a mile of the Wake County line. This will provide an alternate route between Durham and Raleigh and will avoid the dangerous railroad crossings at Cary and Morristown.

B. H. Burrell, S.H.E., who has just arrived in Washington overland from San Diego on an inspection trip of the Southern Highway reports that the highest day's run made from San Diego was from Durham north along the Washington-Atlanta Highway to Petersburg and beyond, the total mileage being about 260.

V. E. Towles, H.E., is still on construction work near Clarksville, Mecklenburg County, Virginia.

Demonstration work in Mecklenburg County has been so satisfactory that the citizens raised a personal subscription of $200 for the betterment of the road.

W. L. Spoon, S.H.E., reports the completion of the Black River bridge in Chesterfield County, S.C. The completion of this and that over Lynches River Bottom, the approaches to which have been graveled during the month, closes two of the worst gaps in the Washington-Atlanta Road in South Carolina.

Field Experiments

Falls Road.

On this road the ditches and shoulders have been cleared and dressed for the entire 5.4 miles. S. L. Taylor, J.H.E., has been in charge of the slope and ditch work on this road with W. A. Ricketts, Patrolman, and a gang of ten men and four teams.

Rockville Pike.

Section six was retreated by the Good Roads Company of Baltimore with D. G. Haire, S.R.C., in charge. The contract price was $1170 or 11.09 cents per square yard. 10,542 square yards received 5,000 gallons of bitumen ad 190.5 cubic yards of top dressing, the application being .47 gallon per square yard and one cubic yard of top dressing to 55.3 square yards of surface. Section one should be finished early in December. This will practically close the season's work and patrolmen alone will continue their duties thereafter through the winter.

Kensington Road.

Heavy repairs have been made on sections 5 and 6 on the east side of South Kensington Road.

George R. Trail, Patrolman, has resigned, effective November 30. His successor has not yet been appointed.

New Projects

As a result of an extended inspection made late in October by E. W. James on the Texas Post Road, a new project has been approved for the supervision of maintenance on that road from Austin to the Bexar County line and arrangements are now being made to cooperate with the counties. Estimate has been received covering one year's maintenance in Travis County and other estimates are now being made under the direction of W. A. Crossland, S.H.E., of the Division of Construction. This project was taken up practically at the request of the local officials and will afford unusually good opportunity for securing accurate maintenance costs under service conditions of about 65 miles gravel road.

Fred Shutts, Parish Engineer, Calcasieu Parish, Lake Charles, Louisiana, has been appointed collaborator in connection with a special maintenance project covering a large part of the newly constructed system of roads in that Parish. Accurate data covering the costs of maintenance and the traffic over a large mileage of gravel, brick, shell, and bituminous gravel and shell will be secured.

Arrangements have been completed for regular reports covering the cost of maintenance of the Maine Post Road recently finished. L. D. Barrows, collaborator, located at the office of the State Commission will secure the necessary data.

Arrangements have been made in part for securing similar data on the concrete post road in Ohio.

The supervision of maintenance on the road from Brooksville to St. Petersburg and on the MacGregor Boulevard will be somewhat delayed owing to the project in Pinellas County to rebuild practically the entire section of the road in question across that county. A bond issue on November 16 provided for paving the road with brick. Hernando County, Florida, has also been delayed in completing the sand-clay section between Brooksville and Arepika. In Pasco County they are ready to cooperate and funds will shortly become available. In Lee County, the trustees of the MacGregor Boulevard and the City Council of Fort Myers have undertaken to provide, with the assistance of the County, $2,750 for the maintenance of the MacGregor Boulevard. It is hoped that at least part of this work can be started by December 1.

DIVISION OF NATIONAL PARK AND FOREST ROADS
T. Warren Allen, Chief.

Projects:

National Forest Roads

District No. 2 - A. E. Palen, H.E., in charge. The four construction projects under way in this district were continued until the latter part of the month when work on the Buffalo-Hazelton road was closed up; the crew on the Rabbit Ear Road was reduced, a part being retained for clearing, grubbing, and bridge work; work on the Sedalia-Nighthawk road was finished and the road crew moved to the Monument-

Nursery Road on which it is expected that about two miles will be constructed this fall and early next spring, after which the crew will be moved back to the Sedalia-Nighthawk road. On each construction project there is a resident engineer. There are three survey parties at work in the district; one on a short survey in the Black Hills, and two on the proposed Pikes Peak-Longs Peak Highway.

District No. 3 - O. N. Powell, H.E., in charge. Work was continued throughout the month on the Red River road in New Mexico, and the road made passable for vehicles though for a considerable distance the road remains incomplete.

District No. 4 - C. H. Kendall, S.H.E., in charge. In Arizona in the Kaibab National Forest, construction work upon the Grand Canyon Highway has been completed and it is now possible for automobiles to traverse the forest for fifty-four miles to Bright Angel Point in three hours. With the completion of the state road from Panguitch to Kanab adirect route from the Grand Canyon to the Yellowstone National Park will be available. In Utah, in the Powell National Forest, construction is nearing completion upon the last three-mile section of the Winder-Escalanta Road east of the summit. In Nevada, in the Ruby National Forest, the Teton Pass Road is nearly completed and it is expected to open this important road to traffic in December. In Idaho, in the Payette National Forest, work has been completed to the east boundary of the Forest with the exception of twenty-four hundred feet of rock excavation, and a sixty-five foot steel bridge being erected across the Deadwood River upon reinforced concrete piers. During the month a survey was made of the Gibbonsville-Bitterroot project in Idaho, the length being fourteen miles. A maximum gradient of five per cent was obtained for about seven miles and on the remainder a uniform average gradient of two and a half per cent. A detailed survey of the Ephraim Canyon Road in Utah upon the proposed route across the Manti National Forest showed its impracticability and a survey through Maple Canyon where a six per cent gradient may be obtained, will be made in the Spring.

District No. 5 - C. C. Morris, H.E., in charge. All bids having been rejected for the work of clearing and grubbing the Trinity River Road in the Trinity National Forest, work was started by administration.

District No. 6 - B. J. Finch, S.H.E., in charge. Construction work in Washington was closed down for the season; in Oregon it was begun on the Tiller-Trail Road where conditions are such as to permit winter work. The survey of the Loop Road around Mt. Hood was completed and work on plans begun. During the month the Chief of Division delivered an illustrated road lecture at Roseburg, Oregon.

National Park Roads

T. C. Peterson, S.H.E., who has been on survey work in Glacier National Park has been temporarily transferred to Portland, Oregon, and is there working on National Park Road plans.

Skamania County, Washington, Road Work.

The contractor on the Columbia River North Road has begun construction on the nine-mile section just north of Stevenson. Surveys of the remainder of this road are nearly finished and plans are well under way.

Lectures and Advice.

Mr. Allen attended the road convention at Ellensburg, Washington, held by the State Good Roads Association, and delivered a paper on the 27th of October. On his return trip to Portland, Oregon, he stopped at Walla Walla, Washington, and addressed a meeting called by the Commercial Club of that city, on October 28. Mr. Allen will probably return to Washington by December 4.

DIVISION OF ROAD MATERIAL TESTS AND RESEARCH
Prévost Hubbard, Chief.

Projects:

Routine Tests and Analyses

During October, about 60 samples of bituminous material were examined. Some hundred samples of rock, slag, cement, etc., were received by the Physical Testing Laboratory, and 90 samples were examined. About 75 samples were classified in the Microscopic Laboratory.

Research Upon the Properties of Dust Preventives and Road Binders

In conjunction with the study of the composition of various grades of top-soil roads, which is being made in the Physical Laboratory, the Chemical Laboratory will undertake a study of the possible means of utilizing bituminous materials in the treatment or construction of such roads. The conclusions drawn from this study will, of course, be applicable also to sand-clay roads, of which top soil is a natural type.

R. H. Lewis, A.C., is engaged upon a short investigation of the relative value of carbon disulphide, benzol, and possibly other solvents as a means of recovering the bitumen from bituminous aggregates, with particular feference to the effect of the solvent on the material recovered.

Dr. Lord is still engaged in the preparation of solutions of bituminous materials for examination under the ultra-microscope, and work is being carried on with a Pasteur-Chamberland filter, in the effort to prepare a solution free from sub-microscopic particles.

Experimental Bituminous Road Construction and Maintenance

During the early part of the month, Mr. Hubbard visited Scranton, Pa., and, together with Mr. Peirce, made an inspection of a number of sections of a new type of pavement, known as the National Pavement, recently laid there. It consists of a mixture of bituminous material

with soil. This mixture is prepared in much the same manner as sheet asphalt topping, except that no attention is paid to the grading of the aggregate. The product is in reality a bituminous mastic and is usually laid directly upon a compacted earth foundation deprived of practically all coarse particles. Samples of the soil and finished pavement were taken and have been examined in the Chemical Laboratory.

Mr. Reeve spent two days in inspecting the North Carolina Post Road between Winston-Salem and Statesville and other roads in Iredell County, for the purpose of collecting samples of the various types of top soil used in road construction in this locality. He was accompanied on the trip by Mack Galbreath, J.H.E.

The Laboratory will, in the early part of December, inspect at the plant, the materials for the experiments in bituminous concrete now under way in the Agricultural Department Grounds.

Non-Bituminous Road Material Investigations

Work on the following projects, already mentioned in previous News Letters, is being continued:

The relation between the toughness and percentage of cement in cement mortar. The results so far obtained indicate that the resistance to impact of cement mortars increases directly with the per cent of cement present for mixtures up to as rich as 1:1, while beyond this point the toughness is affected very little by increase in the content of cement.

A study of the relation existing between the mechanical analysis of concrete sands and the normal consistency and tensile strength of mortars formed from them. Sands which have actually been used in concrete road construction are being utilized in this work, and the results to date promise to be of interest.

In addition to these old projects, the following new projects have been inaugurated:

An examination of the physical properties of typically good and typically poor top soils from Virginia and North Carolina is being made, with the ultimate object of standardizing a series of physical tests which will accurately show the road building qualities of this type of material.

Preliminary experiments have also been started with the object of determining the uniformity of cement content in tensile strength briquettes.

Standardization of Methods of Testing

Mr. Hubbard and Mr. Pritchard have prepared a paper dealing with the subject of the effect of controllable variables on the penetration test, and cooperative work along the same lines with the Penetration Section of the Committee of the American Society for Testing Materials is about completed. In this work both the old Standard No. 2 cambric needle and the needle recently devised in the Office will be checked against one another.

Mr. Anderton is continuing the work on an improved method for making the fixed carbon test.

Additional work on the standardization of a test to determine the abrasive properties of gravel is being continued, also work on the standardization of a test for the apparent specific gravity of rock. In this work an apparatus has been devised which promises to be of particular value in the determination of the specific gravity of such non-homogeneous materials as gravel and slag.

Concrete Investigations

During the past month the large reinforced concrete slab (16 ft. span, 32 ft. wide and 6 inches effective depth) has been tested under single and also under two-point concentrated loading. The results obtained tend to confirm those from previous slabs, and indicate an increase of effective width with a decrease in thickness.

An apparatus has been built for the measurement of wear of concrete pavements under traffic, and is about to be placed in service.

Designs are now complete for an apparatus for measuring the pressure of loads through soils.

Work is being continued on the "flow" of concrete when subjected to long continued stresses, and the results thus far obtained indicate that concrete suffers progressive deformation under constant loads.

The effect on the strength of varying the time of mixing of concrete is likewise being studied, and results are being accumulated which will be of value when the entire series of tests is completed.

DIVISION OF ROAD ECONOMICS
J. E. Pennybacker, Chief.

Projects:

Statistical Investigations

Throughout the United States county agents in the States Relations Service have been asked to cooperate with us in obtaining statistics on road mileage, revenues, and expenditures. Letters have been sent to more than 300 of these agents in counties which have not been heard from. Information is complete for about 2,100 counties.

Experimental Convict Camp

The portable buildings for the model convict camp in Fulton County, Georgia, are completed and will be installed in a few days. H. S. Fairbank, H.E., who is in charge of this camp, has been in Atlanta since October 27, and Mack Galbreath, J.H.E., has been assisting Mr. Fairbank since November 29. Dr. W. F. Draper, of the Public Health Service, left for Atlanta on November 29 to look after the Sanitary and dietary phases of this project, and J. E. Pennybacker leaves December 1, to be in Atlanta when the camp buildings are installed and until the camp is running along smoothly.

Road Management Studies

The road management study of Baltimore County, Maryland, has been completed and a report is being written up. This study was requested by the county authorities and made by A. S. Brainard, E. W. James, and B. L. Vipond. J. J. Tobin, A.R.E., made studies of Lee and Montgomery Counties, Alabama, and R. F. Eastham, H.E., made studies in Essex and Atlantic Counties, New Jersey. Messrs. Tobin and Eastham are now in the Office writing up the reports for these four counties.

Road Material Freight Rates

Freight rates on road-building materials are being obtained and tabulated for all the railroads in the United States on the same plan as that followed for the southern railroads.

Lectures and Road Models

An exhibit of road models was displayed at the District Fair of the Suwanee Fair Association at Live Oak, Florida, November 2-6 by C. T. Harrison, S.R.C. L. E. Boykin, A.R.E., was assigned to exhibit road models at the Industrial, Civic, and Mercantile Exposition at Danbury, Connecticut, November 8-13. An exhibit of road models was on display during the week beginning November 20 at the Municipal Exhibit at Newark, New Jersey. R. F. Eastham was assigned to install this exhibit.

J. T. Bullen, S.H.E., delivered addresses at the meeting of the Louisiana State Good Roads Association, Alexandria, on October 30, and at the Louisiana State Fair, Shreveport, November 3-8. H. S. Fairbank delivered a lecture on Georgia Products Day, November 17, at Atlanta, Georgia. George C. Scales was also assigned to deliver an address on Georgia Products Day, November 18, at Columbus, Georgia. J. J. Tobin delivered an address at Lebanon, Pennsylvania, on the evening of November 23 at the request of Congressman Kreider of Pennsylvania.

County Economic Studies

M. O. Eldridge, A.R.E., made economic studies of Lauderdale County, Mississippi, and Dallas County, Alabama. He is now engaged in checking up reports of the several counties selected for economic studies.

State Highway Department Studies

J. D. Fauntleroy, S.H.E., is now engaged in checking and putting into final shape the reports of the state highway departments studies which have been made to date, preparatory to continuing this work in the field.

Economic Studies of Post Roads

W. E. Rosengarten, H.E., has made final economic studies of post roads in Travis, Hays, Comal, and Bexar Counties, Texas; Leflore and Carroll Counties, Mississippi; Lauderdale County, Alabama; and Montgomery and Loudon Counties, Tennessee. He is now making a study of McDowell County, North Carolina, and will study the post roads in Aiken County, South Carolina, and in Forsyth, Davie, and Iredell Counties, North Carolina, before returning to the Office.

DIVISION OF RURAL ENGINEERING
E. B. McCormick, Chief

Projects:

Domestic Water Supply and Sewage Disposal

G. M. Warren, D.E., is preparing a bulletin on Farm Sewage Disposal. Owing to the numerous requests, a lecture, illustrated by lantern slides, will be compiled from this bulletin, giving the information in condensed form, and typewritten copies of the lecture will be available to institute lecturers and county agents.

Plans are being made for several private water systems supplied by hydraulic rams and by gasoline motors, one ram is on a farm in Pennsylvania, another ram and a motor in two places in Maryland.

Surveys have been made for two sewage disposal plants, one for which the discharge must be very pure. Excavation and forms are ready for concrete for the septic tank in the model plant at Bethesda, Md., and the 900-foot sewer at the Animal Husbandry Farm, at Beltsville, Md., is practically complete.

Correspondence has been very heavy on these subjects as well as on the subjects of farm power and electric lighting.

Farm Structures

Requests continue for the corn crib drawings offered through the Weekly News Letter, the article having been reprinted in a number of agricultural papers.

Work is progressing on the Farmstead bulletin mentioned last month, as well as on that of the New England Barn, the drawings for the latter being about completed and the manuscript under way. The drawings for the Bureau of Animal Industry Bulletin on Sheep Raising

are nearing completion, but the work on the plans of the 7-room farmhouse, also mentioned last month, have been interrupted owing to a pressure of more important work.

Plans for the bull and calf barn, dairy barn, feed barn, and milk house, for the Iberia Live Stock Experimental Farm, in Louisiana, have been completed for the Dairy Division. Drawings are being made for a number of feeding pens to be used in experiments of the individual feeding of hogs, and a man will be sent out about December 15 to visit eight reclamation projects to study conditions under which hog raising is conducted, so that proper structures such as pens, wallows, etc., may be designed, all this work to be done in cooperation with the Bureau of Animal Industry.

A. D. Morehouse, D.E., is gathering information on farm building insurance.

Cooperative Work in Rural Engineering

The fire-extinguisher apparatus mentioned last month is nearing completion in the shops of this Office, and tests are planned for late in December or early in January. Two types of tests are planned, one in the Pittsburgh Explosive Galleries of the Bureau of Mines, and other on old grain separators that will be tested to destruction.

The temporary appointments of J. E. Young and J. C. Woodson, as Assistant Agricultural Engineers, expire in December.

Field Experiments

Traction Tests.

Elmer Johnson has completed the final runs at Portland, Maine, and has returned to Washington with the dynamometer wagon.

The final report of the Alabama Post Road is completed and that of the Iowa Post Road about done. The final study of the Rockville investigation is being made and will be in shape after another run has been made with the wagon on the recently resurfaced road.

Several runs have been made with the dynamometer car in Virginia, in the process of calibrating the springs. A complete set of assembly and detailed drawings of the McCormick Traction Dynamometer have been completed and will be ready for distribution shortly.

H. E. Markley, Student Assistant, resigned from the Office.

DIVISION OF IRRIGATION INVESTIGATIONS
Samuel Fortier, Chief.

Projects:

Administration

In order to increase the value of the Irrigation section of this Field Letter, field men are urged to make note of features of their work which will be of interest and help to other members of the force and to call the attention of Mr. Fortier to these. The wide field covered by the division and the distance of the Washington Office from the field stations of the various employees render the compilation of a really representative news section a matter of some difficulty. The letter is meeting a demand that has been somewhat insistent from the field force for some years past, but might be made much more helpful by a little assistance from the men themselves. It is also urged that short articles which would be suitable for publication in the Department's News Letter to Crop Correspondents, a copy of which is sent weekly to each man on the force, be sent in whenever possible, as this publication is proving of value in securing timely publicity in cases where the delay necessary for publication through the usual channels would do much toward destroying the value of the information.

R. P. Teele, Irrigation Economist, left Washington November 16 on a trip which will include the southwestern states which were omitted from Mr. Fortier's trip last summer on account of lack of time. Mr. Teele spent two days in Denver in conference with Messrs. Cone, Diesem, and Sleight, proceeding from that city to Logan, Utah, via Cheyenne, where he called upon J. T. Kingdon, I.E. At Logan, in company with L. M. Winsor, Agent, Mr. Teele took up matters connected with the cooperation now effective with the Utah Experiment Station. At Reno he met C. G. Haskell, I.E., and with him discussed plans for future work in Nevada in cooperation with the University and the State Engineer. These matters were also discussed with the officials of the cooperating agencies. From Reno Mr. Teele planned to go to Berkeley, and from there to Los Angeles, stopping at Riverside, where W. W. McLaughlin, I.E., is stationed. On his return trip Mr. Teele will visit the Arizona, New Mexico, and Texas fields, where matters connected with cooperative relationships and investigations will be taken up. He expects to return to Washington December 21.

The Irrigation Division will be prominently represented in the meetings of the Second Pan-American Scientific Congress to be held in Washington toward the close of December and early in January. Mr. Fortier is chairman of the sub-section of the congress which will deal with Irrigation, and will open the meetings with an address on Irrigation in the United States. Other members of the force who will either be in attendance at the meetings or will send papers to be read, are S. T. Harding, I.E., whose paper will deal with Adaptation of Methods of Applying Water to Soils; P. E. Fuller, I.E., who will discuss Uniformity of Distribution of Moisture in the Soil; Frank Adams, I.M., who will discuss Irrigation Districts; and R. P. Teele, I.E., who will talk on Public Control of Irrigation in the United States. The Section will also be addressed by well known authorities on irrigation

subjects who are not in the employ of the Department, among them Dr. Elwood Mead, former Chief of the Irrigation Investigations, who will discuss plans for future development of irrigation.

The Office has been definitely assigned four large and well lighted rooms in the east end of the new Federal Building in Berkeley, California, and the California branch of the Irrigation Division will be transferred to these quarters as soon as the building is furnished. C. E. Tait, I.E., whose office was formerly in the Consolidated Realty Building, has been assigned a room in the Los Angeles Federal Building and is now occupying the room. H. C. Diesem, I.E., has moved his office to Denver and is now stationed there.

Use of Water

As the result of a number of conferences held last spring between the representatives of the Office of Public Roads and Rural Engineering and those of the Bureau of Plant Industry, it was decided that the former Office, through its division of irrigation investigations might well make a study of deep percolation losses of irrigation water. Considerable data have already been collected in various districts of the west on the distribution of water in soils by determining the amount of moisture content in each foot layer from the surface down to depths of 6 feet or more. In conducting such experiments it has been found, however, that the character of the soil and the influences of gravity and capillarity are the main factors. It has therefore been decided to make a special study of gravity and capillarity as controlling factors in the movement of water in soils of different texture and W. W. McLaughlin, I.M., who was formerly in charge of irrigation investigations in the State of Utah, has been delegated to take charge of this work. Mr. McLaughlin brings to this study not only a long experience in dealing with irrigation water but also a practical knowledge and experience of chemistry and soil physics. During the past month he has designed and installed suitable equipment at Riverside and when thorough tests are made of capillary action of the soils in that vicinity he will move his equipment to some other locality and test another type of soil. The results already secured seem to upset some of the old and well established theories pertaining to the movement of water in soils as influenced by capillarity and gravity.

S. T. Harding, I.E., has submitted a preliminary report on the duty of water conducted by him on the Minidoka project of the U. S. Reclamation Service last summer. Upon receipt of final data from the Reclamation Service Mr. Harding will complete the report, which will then be sent to the Reclamation Service in accordance with the agreement under which the work was started.

Appliances and Equipment

F. W. Stanley, I.E., has completed his design of a new irrigation spray nozzle, and has placed this in the hands of a model maker. As soon as models are ready they will be submitted, through the Department, to the Patent Office for patenting in the name of the Department.

Mr. Stanley's invention has been evolved as a result of his studies of spray irrigation in Florida and the eastern states during the past three years, and is expected to make possible a large saving in such irrigation. The cost of the apparatus is expected to be moderate, since it consists of but two major parts. The first contains the upright which is fastened to the supply pipe, while the second contains the spray head and nozzles. When the device is in operation there will be no movement while the spray is being thrown, and for the most part only two or three complete movements of the head in several hours. The spray will cover about 3000 square feet, and use about 4 gallons of water per minute. Mr. Stanley also sees wide possibilities in the manufacture of large-size nozzles for use with reinforced concrete laterals, and is now at work on an automatic shut-off or valve in the head of the nozzle so that only one half the nozzles need work at one time.

E. J. Hoff, Mechanician, has also forwarded a device for patenting, this being an automatic weir. The essential feature of the weir is a canvas curtain passing over a roller which is carried and governed by floats so as to form a weir crest that adjusts itself to the water level with very little friction. Mr. Hoff believes that the new device may be readily standardized or rated as to hourly discharge, either by means of a weir after it has been installed or at a hydraulic laboratory. In this way it will become a measuring instrument which is automatic in its operation except for taking the time. The cost of the weir is expected to be very low.

Customs, Regulations and Laws

S. O. Jayne, formerly Irrigation Engineer in charge of the Irrigation Investigations in the State of Washington, called upon Mr. Fortier recently, having been called to Washington for a conference in the Office of Farm Management, where he is now employed. Mr. Jayne has been engaged for several months past in an investigation of the profits of farming on irrigated lands, working on the Huntley project of the United States Reclamation Service and in the vicinity of Ogden, Utah. In this work his twelve years' service with Irrigation Investigations has proved of great benefit, and he has been able to arrive at definite conclusions along several important lines as a result of but one season's work.

DIVISION OF DRAINAGE INVESTIGATIONS
S. H. McCrory, Chief.

Projects:

Administration

From November 7-22 S. H. McCrory was in the field conferring with members of the staff in the Southern States and arranging for future work. On November 8 he was at Raleigh, N. C., with H. M. Lynde, D.E., and F. R. Baker, A.D.E. On November 10-11 he was at Millport conferring with Lewis A. Jones, D.E., relative to the Luxappolila Creek Bottoms survey. From Millport Mr. McCrory went to Charleston where he met Messrs. Okey and Eason to confer with them about the report and plans for the drainage of rice lands along the Cumbahee River, S. C. On the same day he accompanied them on an inspection of that portion of the land which is to be drained at this time. From Charleston, in company with C. W. Okey, Mr. McCrory proceeded to Florida, visiting drainage works at Fellsmere, Vero, Ft. Pierce, Miami, Ft. Lauderdale, and Rita, and finally going into the Everglades.

R. A. Hart, S.D.E., has been transferred from Salt Lake City, Utah, to Berkeley, California, where he will have offices in the Post Office Building. This Office will be made headquarters for employees of the Office of Public Roads and Rural Engineering operating in the Pacific Coast States.

During the past several years the various members in the field have submitted a large number of soil and water samples for analysis by the Bureau of Soils and Chemistry respectively. Both these Bureaus have been taxed very heavily for some time. As we do not wish to add to the work of these bureaus, it is suggested that analyses be not requested unless it is intended to put the information to definitely known use. Both Bureaus have informed us that it usually takes about 3 or 4 days to make the necessary analyses of about 6 samples.

Occasionally some of our field engineers submit samples of clay, gravel, and sand which they wish tested to determine their suitability for use in the manufacture of tile. Arrangements have been made with the Bureau of Standards to have such tests made, but that Bureau desires that each sample be accompanied with complete information concerning its source. It is also suggested that care be exercised in taking the samples so that they may be fairly representative of the deposits as otherwise the tests may be of little or no value.

Farm Drainage

During the month, C. E. Ramser, A.D.E., has been collecting data on terracing as practiced in North Carolina and South Carolina. On November 29 he arrived in Washington where he will compile the information collected with a view to publishing it as a bulletin.

D. L. Yarnell, D.E., was engaged from November 8-12 on the Kelleher Farm, Mt. Jackson, Va., staking out some more drains on that farm, the plans for the drainage system having been made by the Office. Of the 12 miles of tile provided for by the plans, 8 miles have been installed and the remainder will be installed early next spring.

During the month Fred F. Shafer, D.E., made surveys for a number of tile projects in West Virginia and Kentucky. He was also at Cleveland, Tenn.

On November 4, H. M. Lynde arrived at Raleigh, having completed the work on terraces in Missouri for the present. On November 30 and December 1, Mr. Lynde attended the Annual Meeting of the North Carolina State Drainage Association at Belhaven, N. C., for the purpose of addressing the convention on "Tile Drainage Pays."

During the month, J. R. Haswell, D.E., has been assisting farmers on the Eastern Shores of Maryland and Virginia and in Delaware. On November 15 he addressed a Farmer's Institute meeting at Farmingdale, N. J., on "Practical Farm Drainage." The address was illustrated.

Reports Transmitted:

D-9 Colleton Mercantile and Mfg. Co. Farm, Colleton Co., S. C., by F. G. Eason.
D-29 Locke Farm, Little River Co., Ark., by O. G. Baxter.

Reports Received:

D-7 Wigal Farm, Belleville, W. Va., by Fred F. Shafer.

Overflowed Lands

On November 7, O. G. Baxter left Little Rock, Arkansas, to install some experimental drains near Hull, Ill., in Sny Island Drainage District. The object of the experiments is to devise some system of drainage to intercept the seepage from the river through the levees.

F. G. Eason and C. W. Okey have completed the field work on the survey of abandoned rice lands along the Cumbahee River, S. C. Mr. Okey and Mr. Eason will prepare the report at the New Orleans Office.

Reports Received:

D-29 Drainage Conditions in St. Francis Co., Ark., by O. G. Baxter.
D-29 Drainage Conditions in Phillips Co., Ark., by O. G. Baxter.

Irrigated Lands

W. N. Hall arrived at Salt Lake City November 17 where he will assist in finishing up the work in that field before proceeding to Berkeley, California.

Guy A. Hart has finished field investigations in Oregon and is now in the Salt Lake City Office where he will write his report on the French Prairie District, Oregon, before proceeding to the Denver Office.

L. T. Jessup has been engaged during the entire month on the Hershey Drainage District, Hershey, Nebraska.

D. G. Miller has been operating in the Grand Valley, Colorado, the greater portion of the month.

On November 5 W. W. Weir lectured to the Short Course Students of the California Agricultural College at Davis, California.

Reports Transmitted:

D-32A Ross Farm, San Benito, Texas., by W. N. Hall.
D-39A Mellen Tract, North Salt Lake, Utah, by R. A. Hart.
D-39A South Delta Tract, Millard Co., Utah, by R. A. Hart.

Reports Received:

D-34F Twin Falls, Idaho (Progress) by W. G. Sloan.
D-35C Penrose Drainage District, Park Co., Wyo., by D. G. Miller.
D-35A Big Horn County Irrigating Co., and C. F. Renner Tracts, Basin, Wyo., by D. E. Heizer.
D-36A San Luis Valley, Colo., by D. G. Miller and Jay Stannard.
D-43 Marin Meadows Ranch, Marin Co., Cal., by W. W. Weir.
D-43 Zeller-Bulson-Houdeshel Tracts, Napa Co., Cal., by W. W. Weir.
D-43 Drainage near Live Oak, Sutler Co., Cal., by W. W. Weir.

Peat, Turf, and Muck Investigations

Reports Received:

D-49 Peat Lands of San Joaquin and Sacramento River Delta, Cal., by W. W. Weir.

Construction, Operation and Maintenance of Drainage Improvements

On November 17-19, O. G. Baxter was at Columbia, Missouri, assisting in the installation of the experimental cement tile tests being conducted in cooperation with the Bureau of Standards. D. G. Miller and Guy A. Hart respectively, represented the Office in similar tests made at Grand Junction, Colo., and Huntington, Utah, on November 8 and November 12.

Organization, Financing, and Legal Regulations of Drainage Districts

On October 20 the North Carolina Supreme Court rendered a decision in the case of Lang v. Carolina Land and Development Company et. al.

It has been reported that this decision declared the North Carolina drainage law unconstitutional. Upon investigation we find that the decision construed chapter 141 of the 1915 Session Laws of North Carolina, and not the general State drainage law. This special statute failed to provide for compensation to those whose lands were crossed by the ditches or for any damage which might result to the lands. The court held that such a provision was in violation of the constitutional safe guards provided for the protection of private property rights. The case will be reported in 86 Southeastern Reporter, page 599.

This decision again emphasizes the danger of attempting to promote drainage reclamation under special statutes. In states where a comprehensive drainage law exists which has been frequently and liberally construed, those desiring to promote drainage should always avail themselves of the existing law.